

CLAIMS

1. A movement control system comprising at least one three-dimensional imaging apparatus adapted to image an environment and a processor for analysing the image so as to create a model of the environment and generate a movement control signal based on the created model wherein the three-dimensional imaging apparatus comprises an illumination means for illuminating a scene with a projected two dimensional array of light spots, a detector for detecting the location of spots in the scene and a spot processor adapted to determine, from the detected location of a spot in the scene, the range to that spot..
5
2. A movement control system as claimed in claim 1 adapted to be applied to a vehicle.
10
3. A movement control system as claimed in any preceding claim wherein the at least one three-dimensional imaging apparatus is adapted to acquire three dimensional images of the environment at a plurality of different positions and the processor is adapted to process images from the different positions so as to create the model of the environment.
15
4. A movement control system as claimed in any preceding claim wherein the three dimensional imaging apparatus has at least two detectors each detector acquiring an image of the scene from a different position.
20
5. A movement control system as claimed in any preceding claim comprising a plurality of three dimensional imaging apparatuses arranged at different locations on the vehicle to provide images acquired at different positions.
25
6. A movement control system as claimed in claim 4 or claim 5 wherein the processor is adapted to merge the data from the images acquired at different positions.
30
7. A movement control system as claimed in any of claims 4 to 6 wherein the processor is also adapted to apply stereo image processing techniques to images from different positions in creating the model of the environment.
35

8. A movement control system as claimed in claim 7 wherein the processor is adapted to use stereo processing techniques to perform edge/corner detection.
9. A movement control system as claimed in any of claims 4 to 8 wherein the system further comprises a means of determining the relative location of the three-dimensional imaging apparatus as each image is acquired and the processor is adapted to use the information about relative location in creating the model.
10. 10. A movement control system as claimed in claim 9 wherein the means of determining the relative location of the three dimensional imaging apparatus comprises at least one position sensor.
11. 15. A movement control system as claimed in claim 9 wherein the means of determining the relative location of the three dimensional imaging apparatus is the processor which is adapted to identify reference objects in the images from each viewpoint..
12. 20. A vehicle positioning system comprising a three-dimensional imaging apparatus arranged acquire a plurality of three dimensional images of a target area as the vehicle passes the target area and a processor adapted to process the images from the different positions so as to create the model of the environment in relation to the vehicle and determine how to position the vehicle with respect to the target area.
25. 13. A vehicle positioning system as claimed in claim 12 where the system is a parking system, the target area is a parking area and the positioning system determines how to park the vehicle in the parking area.
30. 14. A vehicle positioning system as claimed in claim 12 or claim 13 further comprising a user interface and wherein the processor generates a control signal which gives vehicle control instructions via the interface.
35. 15. A vehicle positioning system as claimed in any of claims 12 to 14 further comprising a drive unit for controlling vehicle movement and the processor controls the drive unit so as to position to vehicle.

16. A vehicle positioning system as claimed in any of claims 12 – 15 wherein as the vehicle is positioned the processor processes information from the three-dimensional imaging apparatus and updates the model of the environment.
5
17. A vehicle having a parking system as claimed in any of claims 12 – 16.
18. A docking control system for a moveable platform comprising a three-dimensional imaging apparatus arranged to acquire three dimensional images of an environment
10 from a plurality of different positions and a processor adapted to process the images from the different positions so as to create the model of the environment in relation to the moveable platform and provide a control signal to a drive means of the moveable platform so as to dock the moveable platform with the environment.
15
19. A vehicle driving aid comprising a movement control system as claimed in any of claims 1 – 6 wherein at least one 3D imager is adapted to image a vehicle blind spot and the movement control signal is a warning that an object has entered the vehicle blind spot.
20
20. A robotic arm control unit comprising a three-dimensional imaging apparatus arranged to acquire three dimensional images of an environment from a plurality of different positions and a processor adapted to process the images from the different positions so as to create the model of the environment in relation to the robotic arm and provide a control signal to a drive means of the robotic arm to either engage an object or accurately place an object.
25
21. A robotic arm control unit as claimed in claim 20 wherein the processor moves at least part of the arm to scan the three dimensional imaging apparatus relative to the environment to acquire images from a plurality of different positions.
30
22. A robotic arm control unit as claimed in claim 20 or claim 21 wherein the three-dimensional imaging apparatus comprises an illumination means for illuminating a scene with a projected two dimensional array of light spots, a detector for detecting the location of spots in the scene and a spot processor adapted to
35

determine, from the detected location of a spot in the scene, the range to that spot.

23. A robotic arm control unit as claimed in claim 22 wherein the three dimensional imaging apparatus comprises at least two detectors, each detector acquiring an image of the scene from a different position.
5
24. A robotic arm control unit as claimed in any of claims 20 to 23 wherein the processor applies stereo image processing techniques to the images acquired from different position.
10
25. A movement control system for a vehicle operable in two modes, a movement mode in which a proximity sensor operates to detect any objects within the path of the vehicle, and an interaction mode in which a three dimensional ranging apparatus determines range information about a target area to form a model of the target area.
15
26. A movement control system as claimed in claim 25 wherein, in movement mode, the three dimensional ranging apparatus operates as the proximity sensor.
20
27. A movement control system as claimed in claim 25 or claim 26 wherein the three-dimensional imaging apparatus comprises an illumination means for illuminating a scene with a projected two dimensional array of light spots, a detector for detecting the location of spots in the scene and a spot processor adapted to determine, from the detected location of a spot in the scene, the range to that spot.
25
28. A movement control system as claimed in claim 27 wherein the three dimensional imaging apparatus comprises at least two detectors, each detector having a different viewpoint.
30
29. A movement control system as claimed in any preceding claim comprising at least two three dimensional imaging apparatuses each having a different viewpoint.
35

30. A movement control system as claimed in claim 28 or claim 39 wherein the processor applies stereo imaging techniques to the images acquired from different viewpoints.